SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES,

47 LAFAYETTE PLACE, NEW YORK.

SUBSCRIPTIONS.—United States and Canada.....$3.50 a year.

Great Britain and Europe..... 4.50 a year.

Science Club-rates for the United States and Canada (in one remittance):

1 subscription	1 year.....	$ 3.50
2 "	1 year.....	6.00
3 "	1 year.....	8.00
4 "	1 year.....	10.00

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VOL. XIV. NEW YORK, AUGUST 16, 1889. No. 341.

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THE APPOINTMENTS BY THE MAYOR to the committee of one hundred on the world's fair of 1892 in New York give very general satisfaction. Fifty-seven industries are represented, and in addition the mayor has named forty-three substantial citizens to fill out the number. Among those specially representing industries, we note, for artists and art collectors, Henry G. Marquand; architects, Richard M. Hunt; banks and bankers, Levi P. Morton; clocks and watches, Daniel F. Appleton; mechanical engineers, Henry R. Towne; civil engineers, John Bogart; periodicals and publishers, John Foord; printing, J. J. Little; railroads, Chauncey M. Depew; scientific and educational interests, Charles F. Chandler. The members of the committee of one hundred have been duly apportioned among the four committees on permanent organization, finance, legislation, and site and buildings. As many of the members of these committees are out of town, no meeting will be held this week. On Tuesday of next week, however, at 3.30 P.M., the committee on finance will meet in the governor's room in the City Hall; and on the following Thursday, at the same hour and place, the committee on site and buildings. The other two committees will not be called upon to act until these two have met. After a site has been selected, the committee on legislation will prepare a bill to be presented to the Legislature.

There is naturally some desire on the part of the smaller cities, more especially Chicago, that the exhibition, or some part of it, should be held within their limits; Boston, for instance, asking only a branch show specially devoted to New England. There is no likelihood of any splitting of the show into local exhibitions, and the site for the whole will depend, except in so far as political influences may warp things, on the commercial interests at stake. As the time has come when world's fairs pay their expenses if skilfully managed, there is no longer need of a call for any sacrifice on the part of those who will pledge themselves for the expenses. This needed guaranty of funds can be secured in this city just as soon as it shall appear wise to ask it; the question now agitating those having the financial matters in charge being as to how far the money shall be raised by popular subscription to bonds of small denomination, the better to enlist popular interest. If any city except Washington should ask for government aid, it is to be supposed that this of itself would rule that city out of the race, the winner in which will be decided by Congress.

Washington not being a commercial city, it seems undesirable that the exhibition should be held there, especially as there are lacking the facilities for handling the large shipments of goods and the number of visitors. At the same time, the hotels of Washington are of low grade, and entirely unequal to the demands of a world's fair. Then, again, the weather in Washington is likely to be much more oppressive in summer than in New York. The great objection to New York that has been brought forward so far is the lack of local pride. This lack, as is well pointed out in *The Evening Post*, is due to the fact that New York is *facile princeps* among American cities: it is only the little man and the little town that have to boast continually of such good as they may possess, in order that they may not be ignored, and that have to strive constantly to make their good points the better. New York certainly lacks this spur; but she is made up of shrewd business-men, who are amply able to carry through a world's fair just as soon as they have decided that their interests demand it.

THE UNITED STATES, THEIR GROWTH IN POPULATION IN TWO HUNDRED YEARS.

IN 1798, eight years after the first census of the United States was taken, Malthus, in England, published his "Treatise on the Law of Population," which excited great interest, and brought the author much hostile criticism. In June, 1890, we shall take the eleventh census of the United States, and will know with certainty what has been our increase in a hundred years. We expect to find a population of 67,240,000. Malthus held that population in a wide country, affording plenty of space and producing abundant food, doubled every twenty-five years. Trying his estimate by the recorded figures of ten decennial census enumerations, we find that he was very nearly correct.

With the aid of this information, we attempt to discuss the results to date, and to infer something of the progress of the next hundred years. We do not think it rash to infer the work of a century from the known advance during one just expiring. Taking the figures of the past from "Johnson's Cyclopædia," we find the population of the North American Colonies estimated by Bancroft as follows: —

Year.	Population.
1750	1,260,000
1754	1,425,000
1760	2,195,000
1770	2,312,000
1780	2,945,000

The following table shows the rate of increase since 1790, as shown by the census returns : —

Year.	Population.	Increase in 10 Years.
1790	3,929,214	
1800	5,308,483	35.1 %
1810	7,239,881	36.3
1820	9,633,822	33.1
1830	12,866,020	33.5
1840	17,069,453	32.6
1850	23,191,876	35.8
1860	31,443,321	35.6
1870	38,558,371	22.6
1880	50,155,000	36.0
1890	67,240,000	34.0

The mean of the rates is 33.46 per cent. If we substitute for 22.6 (the exceptional rate of the increase between 1860 and 1870) 34.8 per cent (a mean between the rates immediately preceding and following the decennial epoch), we find as probable rates of increase and aggregates of population, had peace continued, the following : —

Year.	Population.
1870	42,380,000
1880	57,130,000
1890	77,100,000

This is 9,860,000 more than the population actually to be expected in the next census, — loss to be attributed to a great war. Other variations in the decennial rate of increase are due to the war of 1812, the Mexican war, the cholera epidemics, etc., and to emigration.

In estimating the progress of population during another century, it is not perhaps rash to assume a rate of 33.3 per cent, which is a little less than the mean rate, including war and pestilence, which has ruled our growth in the last century. Adding one-third to each decennial estimate, we find the probable population to be as follows : —

Year.	Population.
1890	67,240,000
1900	89,653,333
1910	119,737,777
1920	159,650,377
1930	212,867,177
1940	283,822,877
1950	381,763,837
1960	509,018,449
1970	678,691,265
1980	904,921,686
1990	1,206,562,248

This completes the century. Then, as the area of the territory of the United States is 3,026,494 square miles, the density of its population in 1990 will be 399 to the square mile. The density of population in certain countries is given in the same cyclopædia (printed in 1878) as follows : United States, 12.7 per square mile ; Atlantic States, 46.6 ; basin of the Ohio, 37.7 ; Massachusetts, 201 ; Ohio, 66 ; Belgium, 434 ; China, 420 ; England, 389 ; Europe, 71 ; Asia, 46 ; Africa, 16 ; America, 6 ; Australia, ½. Such a nation will have a power and a commerce and industry not heretofore known to the world. Our ships and those of our allies will bring the spare products of every land to our shores. Systems of interior land and water transport, perhaps mostly operated by electric power, will rapidly and cheaply distribute them.

For a century we may hope to live comfortably and abundantly within our boundaries. But other people must grow also. The now empty and waste places of the earth will be occupied by civilized and industrious nations. We have in this generation made wonderful and rapid progress in the discoveries and inventions of science. We use the electric force, as did our fathers that of steam. In all probability, electricity will heat as well as light our houses, and will cook our food, It will drive other as well as our city passenger railroads. And it is not probable that man has yet discovered all the resources laid up by the Creator to be discovered and utilized by his creatures when needed for their happiness and comfort.

The Anglo-Saxon race will occupy the continent from the Isthmus to the Arctic, and, when crowded therein, must spread over South America, or perish. That they are not likely to submit to As the prairie wolf disappears when man drives off or subjugates the animals on which he lives, and for whose regulation he appears to have been created, so will the weaker races give way to the stronger. It has been thus in all history, and the law still holds. There are in the United States a majority of whites over blacks of 51,000,000. They will be able to settle without bloodshed most of the apparently troublesome questions as to races, as may to them seem best ; and when they agree upon the methods, and necessity enforces the duty, they will settle them for the best good of the greatest number.

Soon after the civil war it was often said that they who believed in the success of the United States, and conducted their affairs on the theory of such success, grew rich and prospered. They who took the opposite belief were unsuccessful, and lost their fortunes. Those who believe in the prospects here set forth will rule their undertakings and investments in the expectation that property in real estate must advance in the next half-century ; that commerce and transportation and production must increase enormously. As the discoveries and inventions of science and industry make towns more and more healthful, convenient, interesting, and agreeable places of residence, our people will tend more and more toward them. Museums, libraries, public halls for the education and instruction and amusement of the people, will be more and more numerous and cheap. The streets and parks will be embellished and made gay with public and private buildings. Electric engines will do the heavy work of the day. More time will be at the disposal of men for enjoyment, as these improvements relieve men and women from slavish toil for the means of living.

It may be assumed that the cities will grow at least as fast as the country. In 1790 the urban population was estimated at one-thirtieth the whole ; in 1840, at one-twelfth ; and in 1870, at one-fifth. In 1990 the urban population will be 240,000,000 ; and of these, New York will probably contain over 30,000,000. What will be the value of lands in that city then, may be inferred from the auction-sales of London, which has 4,000,000 people. But there is here an inexhaustible field for investigation and speculation. We leave it to others to explore, having fulfilled the task we set ourselves, of calling the attention of those who inaugurate or direct great enterprises to the need of looking, in arrangements for the future, to a longer period than the decennial census, which is the limit of all speculations on the subject of population and growth which I remember to have seen in print. Twelve hundred millions of intelligent, educated, industrious people, of one race and blood, under one free government, armed with all that science teaches and man has invented — who will wish to interfere with their happiness ? Who will attack them ?

The probable increase in the ten years from 1930 to 1940 will be about 68,000,000. This is equivalent to 13,600,000 families. Considering only the building trades, this will require the construction in ten years of 14,000,000 new domiciles or family residences. Each will need as much floor and window area as now. Does any one yet foresee the volume of business and its activity, in constructing within a single decade as many buildings as at this time exist within the limits of the United States ?

What work for architects, contractors, builders, carpenters, masons, brick-layers, plasterers, brick-makers, quarriers, saw-mills,

lime-kilns, sand-gatherers, rolling-mills for structural and roofing iron in sheets and beams, for tinners and roofers, and the thousand other trades engaged in construction, not only of the 14,000,000 new homes, but of the markets, stores, warehouses, post-offices, court-houses, city-halls, jails, penitentiaries, etc., necessary in the administration of an additional population equal to all that exists now on the northern continent! What will be the work of providing, and delivering at every house, three meals a day, and every day, for each inhabitant thereof? M. C. MEIGS.

BACTERIA IN MILK AND ITS PRODUCTS.

DURING the past year, investigations on the bacteria of milk have been carried on in the laboratory of the Agricultural Experiment Station, Mansfield, Conn., under the direction of H. W. Conn, professor of biology in Wesleyan University. The following is a brief summary of some of the more interesting results of this work.

The term "bacteria" is used to comprise a class of organisms found abundantly in the air, water, and soil, and in plants and animals. As commonly employed, the term includes a large variety of organisms, which naturalists divide into the three classes, bacteria, yeasts, and moulds. The term "microbe" has been recently introduced to cover this same ground, and is for many reasons preferable. The plants included under this head are exceedingly numerous, and the part they play in nature is of great importance. They multiply with the greatest rapidity, a single individual in the course of a few days being able to give rise to millions. While they are thus growing and multiplying, they produce great changes in the medium in which they grow. All fermentation (such as raising of bread, fermenting of beer, cider, etc.), putrefaction and decay (such as rotting of potatoes, decay of wood, etc.), are produced by the organisms here included. They are of immense value as well as injury. Through their agency, dead animal and vegetable matter is decomposed, and prepared to be incorporated with the soil and to be used as food by plants. It is doubtful if vegetable life could be long continued without their aid. On the other hand, they cause disease in plants, and disease in animals; many of the most dangerous diseases, as cholera, typhoid-fever, consumption, hog cholera, bovine tuberculosis, chicken cholera, etc., being produced by these disease germs. These organisms are extremely minute and simple. They are commonly not more than one two-thousandth of an inch in length. In shape they show three chief varieties, which may be compared to a lead-pencil, a ball, and a corkscrew. To-day they are universally regarded as plants, in spite of the fact that many of them are endowed with motion.

Methods of Experiment.

The method of experiment has been that common in modern bacteriological research. For culture solutions the ordinary beef peptone solution, stiffened by gelatine, or more commonly by agar-agar, has been used. For most of the experiments with cream, "ripened cream" has served as a starting-point. In some cases sweet cream has been ripened in the laboratory, and examined each day, but more commonly specimens of ripened cream have been obtained from the dairy of a butter-maker and directly studied. Plate cultures have been made from the cream, usually with agar-agar, since the organisms found grow in this medium most readily. From the various colonies found in the agar plates, needle cultures have been made in gelatine. Subsequent purification of the organisms has been made in the ordinary way, by transferring from tube to plate, and plate to tube, until the bacteria were separated from each other in pure cultures.

For further experiment, milk has been sterilized in test-tubes. This can be done at a temperature of about 70° C., but it has been found more convenient to put the tubes for a few minutes in a steam sterilizer. Sterilization upon three successive days is commonly sufficient, but in a few cases milk was found to change even after such treatment. The sterilization of cream has been accomplished in the same way. There is more difficulty in this, however, for the cream is apt to form a thick layer on the surface, with a thin watery layer below; and this occurs even in cream that is thoroughly sterilized. In the experiments upon the action of the different bacteria upon milk, the inoculations have been made, and the tubes allowed to remain at the temperature of the laboratory for a day or two. If no change occurs, they are then placed in a thermostat at a temperature between 30° and 35° C., and allowed to stay there till they have produced their effect upon the milk.

Accompanying all of the experiments upon milk and cream, a series of experiments have been carried on with the same organisms upon three different solutions. One was the ordinary beef peptone solution without gelatine; the second, the same solution, to which a small amount of milk-sugar had been added; and the third, the beef peptone solution, with the addition of glucose instead of milk-sugar.

Inasmuch as the object has been to determine the general effect upon milk and its products of the various bacteria present in the air, it has been necessary to work with all the numerous species that have been found in ripened cream. This has necessitated a very large number of experiments, continuing through eight months. The account of these experiments, which, to be in any way useful, will require a large number of pages of detailed description of individual species of bacteria, as well as their action and effects, is reserved for the next annual report of the station. At present it is designed to give only a brief summary of the most important facts concerning the relation of bacteria to milk and its products. For this reason the following remarks include results of the work done at the station, and of other investigators as well, and some conclusions derived from them.

Bacteria in Milk, Cream, and Butter.

Milk is a medium in which bacteria grow with the greatest readiness. Experiments have thus far given indication of some thirty or forty species of bacteria that are floating in the air in this vicinity, every one of which is found in cream, and grows with the greatest facility in milk. Probably none of those which were studied produce disease, and hence are called non-pathogenic. The researches of others have shown that many of the disease (pathogenic) germs also find in milk a favorable medium for growth. According to experiment, cream seems to be even a better medium for the growth of bacteria than milk; for it will keep longer without putrefying, and thus allow some of the slower-growing species to develop. Butter is not a good medium for the growth of bacteria, apparently because they require for their development a certain amount of albuminous material, of which good butter, being mostly fat, contains only a minute amount. Bacteria have, however, always been found present even in the sweetest of butter, but usually in small numbers. When for any reason they become very numerous, the butter becomes tainted.

If milk, cream, or butter is kept free from bacteria, the ordinary changes do not take place in them. For example: the bacteria in milk can be readily killed by heating the milk to a boiling or even lower temperature for a few moments upon three successive days; and then, bacteria being excluded, the milk is found to keep sweet indefinitely. Killing the bacteria by heat is known as sterilizing. If a lot of milk is thus sterilized, and then a few of any particular species of bacteria are put into it, the effect which this species produces upon the milk can very easily be determined. It is in this way that the experiments have been made.

Milk and cream under ordinary conditions cannot be kept free from bacteria. Milk drawn from a healthy cow is free from them, but they may get into it when the milk is in contact with the air during milking. A single experiment will indicate the difficulty of keeping them out of milk. Eight test-tubes were washed perfectly clean, and plugged with a mass of cotton. They were then heated very hot until all living matter in them was killed. These were taken into a milking-yard, and, after the teats of the cow and the hands of the milker had been carefully washed, the cotton plug was taken out and milk drawn directly from the cow into the tubes, and the cotton plug replaced. Of these eight tubes, seven soured in a few days, and many bacteria were found in them. The other remained sweet for a long time, but eventually it also changed. From this experiment it is seen that in the few seconds in which it was exposed to the air the milk was contaminated with bacteria. A very common source of contamination of milk is from